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SUGHRUE MION, PLLC				
2100 PENNSYLVANIA AVENUE, N.W.				
SUITE 800				
WASHINGTON, DC 20037				
EXAMINER				
LI, SHI K				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/699,688

**Applicant(s)**

BULOW, HENNING

**Examiner**

Shi K. Li

**Art Unit**

2613

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 March 2008 and 08 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3-10, 12-20 and 23-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-10, 12-20 and 23-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 10 recites a computer readable medium storing a program for performing a method. The method comprises steps including "splitting the optical signal into parts and providing the signal parts to a respective branch of at least two branches". However, instant specification does not teach how a program stored in readable medium, when executed by a computer, can split an optical signal into parts. The method further comprises limitation "filtering at least one split optical signal". However, instant specification does not teach how a program stored in readable medium, when executed by a computer, can filter an optical signal. To the understanding of the Examiner, the splitting of optical signal, as taught by instant specification, is done by a splitting unit instead of a computer program.

***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1, 3, 6, 12, 14, 23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawarai (U.S. Patent 6,707,963) in view of Jung et al. (U.S. Patent 7,068,949 B2), Van den Bergh et al. (European Patent Application EP 0,996,243 A1) and Wan et al. (U.S. Patent 7,158,723 B2).

Regarding claims 1, 6 and 27, Kawarai discloses in FIG. 6 a wavelength locker comprising splitter for splitting light signal into a plurality of branches, filters 36 and 38, photodiodes 40 and 42, and calculation unit. The difference between Kawarai and the claimed invention is that Kawarai splits the signal into three branches while FIG. 6 only shows two photodiodes. Jung et al. teaches in FIG. 1 splitters 28a and 28b for splitting a signal into three branches. In particular, the splitter 28b splits an optical signal into two branches. One of ordinary skill in the art would have combined the teaching of Jung et al. with the wavelength locker of Kawarai because the combination of Jung et al. and Kawarai would have yielded predictable results. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a splitter with two branches, as taught by Jung et al., in the wavelength locker of Kawarai because the combination of Jung et al. and Kawarai would have yielded predictable results.

The combination of Kawarai and Jung et al. still fails to teach using digital signal processing (DSP) in the calculation unit. Van den Bergh et al. teaches in FIG. 2 A/D converters 11 and digital signal processor 12. Wan et al. teaches in FIG. 4 ADC and microprocessor for controlling purpose. One of ordinary skill in the art would have been motivated to combine the teaching of Van den Bergh et al. and Wan et al. with the modified wavelength locker of Kawarai and Jung et al. because digital signal processing provides high accuracy and flexibility. Thus it

would have been obvious to one of ordinary skill in the art at the time the invention was made to use digital signal processing, as taught by Van den Bergh et al. and Wan et al., in the modified wavelength locker of Kawarai and Jung et al. because digital signal processing provides high accuracy and flexibility.

Regarding claims 3 and 12, Kawarai teaches in col. 4, lines 20-23 different filters for 36 and 38. They are spectral filters.

Regarding claim 14, Kawarai teaches a WDM network. It is well known in the art that a WDM network can have over 100 channels each of which can carry 10 Gb/s or more. That is, Kawarai suggests or renders obvious that the modified wavelength locker is provided in a terabit optical network. The Examiner also notes that the additional limitation only constitutes a statement of intended use and does not carry patentability weight.

Regarding claims 23 and 25-26, Kawarai teaches in FIG. 6 spectral filters with different transmission intervals.

5. Claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bülow (U.S. Patent 5,793,511) in view of Van den Bergh et al. (European Patent Application EP 0,996,243 A1) and Wan et al. (U.S. Patent 7,158,723 B2).

Regarding claims 1, 6 and 27, Bülow discloses in FIG. 1 an optical receiver comprising an input 1.19, photodiodes 1.8 and 1.9, splitter 1.6, filters 1.4 and 1.5, and equalization circuit 1.2. The difference between Bülow and the claimed invention is that Bülow does not teach using digital signal processing (DSP) in the equalization circuit. Van den Bergh et al. teaches in FIG. 2 A/D converters 11 and digital signal processor 12. Wan et al. teaches in FIG. 4 ADC and microprocessor for controlling purpose. One of ordinary skill in the art would have been

motivated to combine the teaching of Van den Bergh et al. and Wan et al. with the optical receiver of Bülow because digital signal processing provides high accuracy and flexibility. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use digital signal processing, as taught by Van den Bergh et al. and Wan et al., in the optical receiver of Bülow because digital signal processing provides high accuracy and flexibility.

Regarding claim 3, 12 and 23, Bülow teaches in FIG. 1 different filters. They are polarization filters.

Regarding claim 5, Bülow teaches in FIG. 1 polarizer 1.7.

Regarding claim 7-8 and 15-17, Bülow teaches in FIG. 1 data signal 1.10 and in FIG. 3 and FIG. 4 decision circuits for determining the probability of 0 and 1 bits.

Regarding claim 19, Bülow teaches in FIG. 1 polarizer 1.7.

Regarding claims 24 and 26, Bülow teaches in FIG. 1 polarization filters 1.4 and 1.5 with orthogonal orientations.

6. Claims 1, 3, 5-7, 12-13, 15-17, 19, 23-24 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor (U.S. Patent 7,106,979 B1) in view of Prigent et al. (U.S. Patent 5,355,240), Van den Bergh et al. (European Patent Application EP 0,996,243 A1) and Wan et al. (U.S. Patent 7,158,723 B2).

Regarding claims 1, 6-7, 12, 15 and 20, Taylor discloses in FIG. 1 a PMD compensation apparatus comprising splitter 95 for tapping a portion of the optical signal for adjusting retarder 30. Taylor teaches in col. 9, lines 11-12 that the compensated signal 99 is supplied to a receiver. FIG. 3 teaches filters 52, 54 and 56 and detectors 62, 64 and 66. The differences between Taylor and the claimed invention are (a) Taylor does not teach a filter and a photodiode for the branch

99 and (b) Taylor does not teach digital signal processing unit. Prigent et al. teaches in FIG. 1 a receiver comprising optical signal correction means and optical signal processing means wherein the optical signal correction means comprises a dispersion compensator and an output filter and the optical signal processing means comprises a photodiode 20. One of ordinary skill in the art would have been motivated to combine the teaching of Prigent et al. with the PMD compensation apparatus of Taylor by connecting compensated signal 99 to the receiver of Prigent et al. because signal processing means of Prigent et al. corrects non-linear effects and chromatic dispersion. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to include signal processing means, as taught by Prigent et al., in the PMD compensation apparatus of Taylor because signal processing means of Prigent et al. corrects non-linear effects and chromatic dispersion.

The combination of Taylor and Prigent et al. still fails to teach using digital signal processing (DSP) in the calculation unit. Van den Bergh et al. teaches in FIG. 2 A/D converters 11 and digital signal processor 12. Wan et al. teaches in FIG. 4 ADC and microprocessor for controlling purpose. One of ordinary skill in the art would have been motivated to combine the teaching of Van den Bergh et al. and Wan et al. with the modified PMD compensation apparatus of Taylor and Prigent et al. because digital signal processing provides high accuracy and flexibility. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use digital signal processing, as taught by Van den Bergh et al. and Wan et al., in the modified PMD compensation apparatus of Taylor and Prigent et al. because digital signal processing provides high accuracy and flexibility.

Regarding claim 3, Taylor teaches in FIG. 3 polarization filters.

Regarding claim 5 and 19, Taylor teaches in FIG. 3 PMD element 40.

Regarding claim 13, Taylor teaches in FIG. 3 polarization filters and Prigent et al. teaches in FIG. 1 chromatic dispersion element and spectral filter.

Regarding claims 16-17, 23-24 and 26-29, Taylor teaches in FIG. 3 different polarization filters and Prigent et al. teaches in FIG. 1 chromatic dispersion element and spectral filter.

7. Claims 4 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bülow, Van den Bergh et al. and Wan et al. as applied to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27 above, and further in view of Al-Araji et al. (U.S. Patent 6,559,756 B2).

Bülow, Van den Bergh et al. and Wan et al. have been discussed above in regard to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27. The difference between Bülow, Van den Bergh et al. and Wan et al. and the claimed invention is that Bülow, Van den Bergh et al. and Wan et al. do not teach field program gate array (FPGA). Al-Araji et al. teaches in col. 6, lines 37-40 that DSP circuit could be implemented with FPGA. Where the claimed differences involve the substitution of interchangeable or replaceable equivalents and the reason for the selection of one equivalent for another was not to solve an existent problem, such substitution has been judicially determined to have been obvious. See *In re Ruff*, 118, USPQ 343 (CCPA 1958). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use FPGA as DSP circuit.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bülow, Van den Bergh et al. and Wan et al. as applied to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27 above, and further in view of Chouly et al. (U.S. Patent Application Pub. 2004/0017857 A1).



Bülow, Van den Bergh et al. and Wan et al. have been discussed above in regard to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27. The difference between Bülow, Van den Bergh et al. and Wan et al. and the claimed invention is that Bülow, Van den Bergh et al. and Wan et al. do not teach a MAP algorithm. Chouly et al. teaches a MAP algorithm (see paragraph [0106]). One of ordinary skill in the art would have been motivated to combine the teaching of Chouly et al. with the modified optical receiver of Bülow, Van den Bergh et al. and Wan et al. because MAP algorithm minimizes errors. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use MAP algorithm, as taught by Chouly et al., in the modified optical receiver of Bülow, Van den Bergh et al. and Wan et al. because MAP algorithm minimizes errors.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bülow, Van den Bergh et al. and Wan et al. as applied to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27 above, and further in view of Lima et al. (A. Lima, et al., "Polarization Diversity and Equalization for PMD Mitigation in Optical Communication Systems", IEEE International Conference on Acoustics Speech, and Signal Processing, May 13-17, 2002).

Bülow, Van den Bergh et al. and Wan et al. have been discussed above in regard to claims 1, 3, 5-8, 12, 15-17, 19, 24 and 26-27. The difference between Bülow, Van den Bergh et al. and Wan et al. and the claimed invention is that Bülow, Van den Bergh et al. and Wan et al. do not teach a computer readable medium. Lima et al. teaches on page 2723, right col. simulation of an optical receiver. A simulation inherently uses a computer with computer program stored in readable medium for the simulation or it is obvious to use a computer with computer program stored in readable medium for the simulation. One of ordinary skill in the art

would have been motivated to combine the teaching of Lima et al. with the modified optical receiver of Bülow, Van den Bergh et al. and Wan et al. because simulation helps confirming design and determining design parameters. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a computer with readable memory for simulating the modified optical receiver of Bülow, Van den Bergh et al. and Wan et al., as taught by Lima et al., because simulation helps confirming design and determining design parameters.

***Response to Arguments***

10. Applicant's arguments filed 20 March 2008 and 8 April 2008 have been fully considered but they are not persuasive.

The Applicant argues "that for a splitting unit to split the optical signal, there may be some stored instructions that instruct the splitting unit to split the signal. Accordingly, contrary to the Examiner's allegations, it is not impossible to have instruction instructing the splitting unit to split the signal. Claim 10 is clearly enable and supported by the specification. Accordingly, Applicant respectfully requests the Examiner to withdraw these grounds of rejection." However, the Applicant fails to cite any paragraph or figure of instant specification for supporting the limitation. Therefore, instant specification does not teach how a program stored in readable medium, when executed by a computer, can split an optical signal into parts.

11. Applicant's arguments with respect to claims 1, 3-10, 12-20 and 23-29 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shi K. Li whose telephone number is 571 272-3031. The examiner can normally be reached on Monday-Friday (7:30 a.m. - 4:30 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

skl  
20 October 2008

/Shi K. Li/  
Primary Examiner, Art Unit 2613